

RESEARCH MEMORANDUM

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SUPPLEMENTARY DATA ON AIRSPEEDS AND MACH NUMBERS
ATTAINED BY LOCKHEED CONSTELLATION AIRPLANES
IN TRANSCONTINENTAL OPERATIONS

By

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**NATIONAL ADVISORY COMMITTEE
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A total of 197 hours of time histories of airspeed and altitude have been obtained on Lockheed Constellation airplanes flying between New York, N. Y. and San Francisco, Calif. during May 1946 and June 1946. Data for 130 hours were previously analyzed to determine the probability of attaining excessive airspeeds and Mach numbers and the results have been published (reference 1). After the publication of reference 1, data for an additional 67 hours became available. All the data were obtained at altitudes less than 20,000 feet and under approximately the same conditions. The combined data have been analyzed as in reference 1 to obtain the results given in the tables and figures contained herein.

Based on the combined data, the probability of exceeding a given airspeed or Mach number is of the same order of magnitude as that given in reference 1. The conclusions of reference 1 are, therefore, unchanged.

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REFERENCE

1. Steiner, Roy: An Analysis of Airspeeds and Mach Numbers Attained by Lockheed Constellation Airplanes in Transcontinental Operations during the Early Summer of 1946. NACA RM No. L7C05, 1947.

TABLE I

CHARACTERISTICS OF LOCKHEED CONSTELLATION AIRPLANE

Gross weight, lb, design take-off	90,000
Wing area, sq ft, value used in design	1,650
Wing span, ft	123
Mean aerodynamic chord, ft	14.67
Slope of lift curve, per radian (value used to calculate gust load factor)	4.67
Maximum indicated airspeed in level flight, mph (any altitude)	271
Placard "never-exceed" speed, mph	324
Critical Mach number (wind-tunnel value)	0.65

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TABLE II

FREQUENCY DISTRIBUTIONS OF MAXIMUM AIRSPEEDS
FOR VARIOUS FLIGHT CONDITIONS

Equivalent airspeed (mph)	Frequency (climb)	Frequency (level flight)	Frequency (descent)
150 - 155	2		
155 - 160	1		
160 - 165	3		
165 - 170	6		
170 - 175	7		
175 - 180	16		
180 - 185	31		
185 - 190	23	4	
190 - 195	20		
195 - 200	25	1	
200 - 205	16	11	
205 - 210	36	15	
210 - 215	11	35	
215 - 220	13	66	2
220 - 225	1	80	3
225 - 230	9	184	3
230 - 235	5	110	2
235 - 240	4	244	4
240 - 245	1	169	2
245 - 250	2	223	11
250 - 255	2	118	8
255 - 260		129	13
260 - 265	2	43	21
265 - 270		45	27
270 - 275		5	31
275 - 280		6	32
280 - 285			23
285 - 290			24
290 - 295			25
295 - 300			21
300 - 305			10
305 - 310			4
310 - 315			4
315 - 320			3
Total	236	1488	273

TABLE III

FREQUENCY DISTRIBUTIONS OF MAXIMUM MACH NUMBERS
FOR VARIOUS FLIGHT CONDITIONS

Mach number	Frequency (climb)	Frequency (level flight)	Frequency (descent)
0.22 - 0.23	3		
0.23 - 0.24	4		
0.24 - 0.25	10		
0.25 - 0.26	8	1	
0.26 - 0.27	15		
0.27 - 0.28	17		
0.28 - 0.29	26	1	
0.29 - 0.30	24	1	
0.30 - 0.31	19	2	3
0.31 - 0.32	24	1	3
0.32 - 0.33	22	3	1
0.33 - 0.34	16	1	1
0.34 - 0.35	15	4	5
0.35 - 0.36	11	39	6
0.36 - 0.37	10	57	9
0.37 - 0.38	6	85	11
0.38 - 0.39	3	136	21
0.39 - 0.40	2	183	24
0.40 - 0.41		201	20
0.41 - 0.42		264	28
0.42 - 0.43	1	193	26
0.43 - 0.44		154	34
0.44 - 0.45		117	24
0.45 - 0.46		28	20
0.46 - 0.47		13	10
0.47 - 0.48		4	7
0.48 - 0.49			14
0.49 - 0.50			2
0.50 - 0.51			3

0.53 - 0.54			1
Total	236	1488	273

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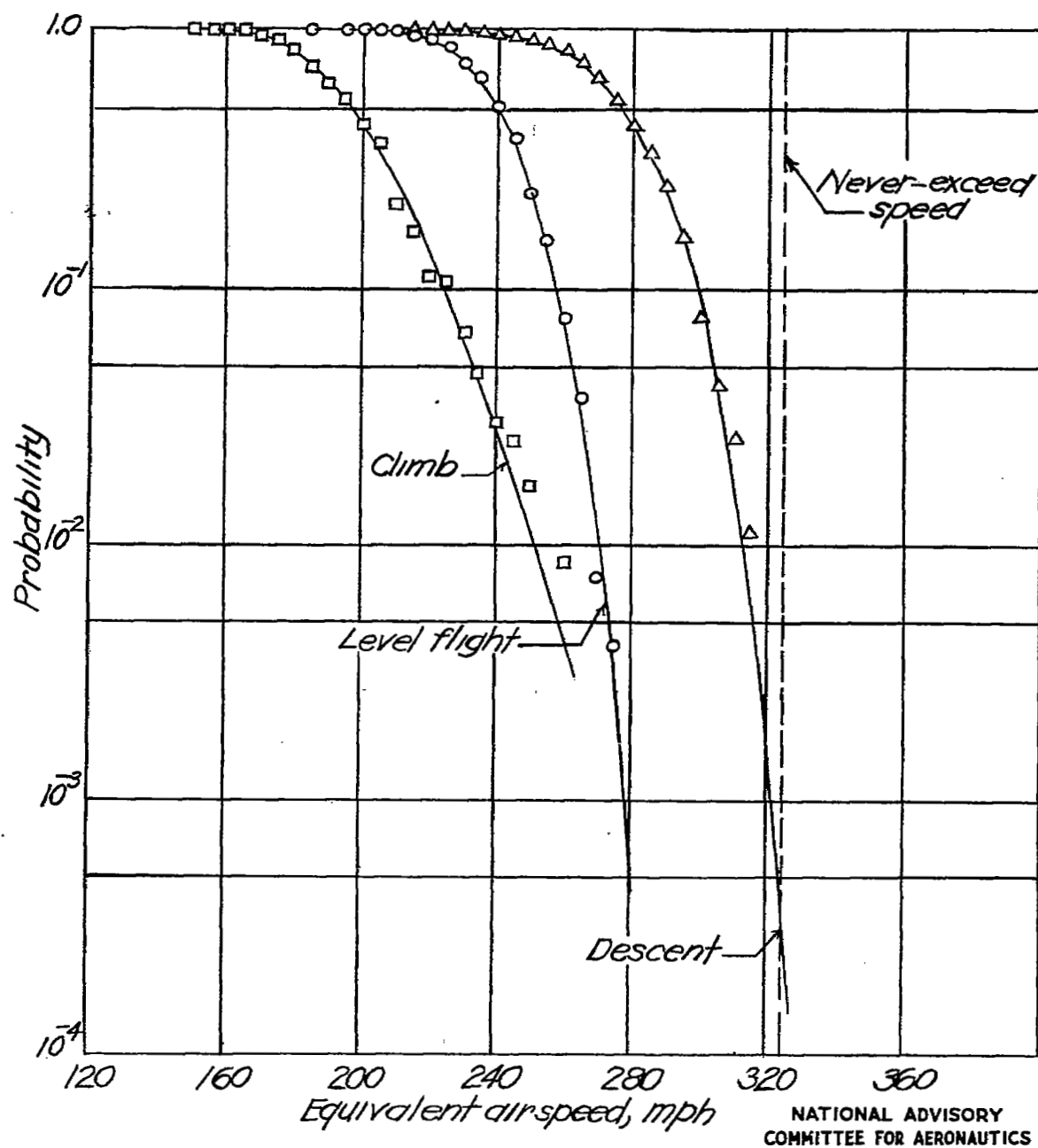


Figure 1.—Probability of exceeding a given value of airspeed in a 6-minute interval.

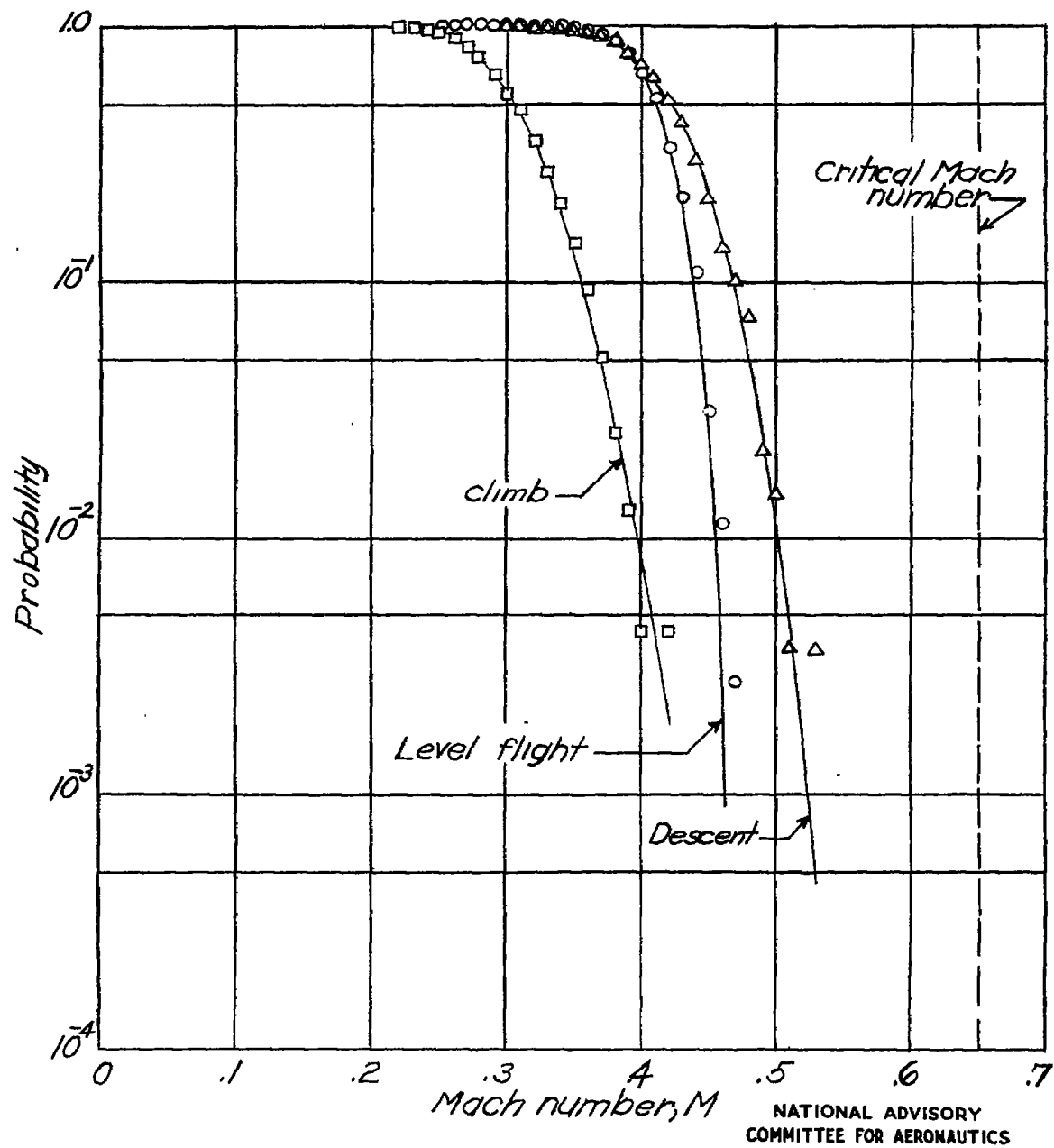


Figure 2.—Probability of exceeding a given value of Mach number in a 6-minute interval.

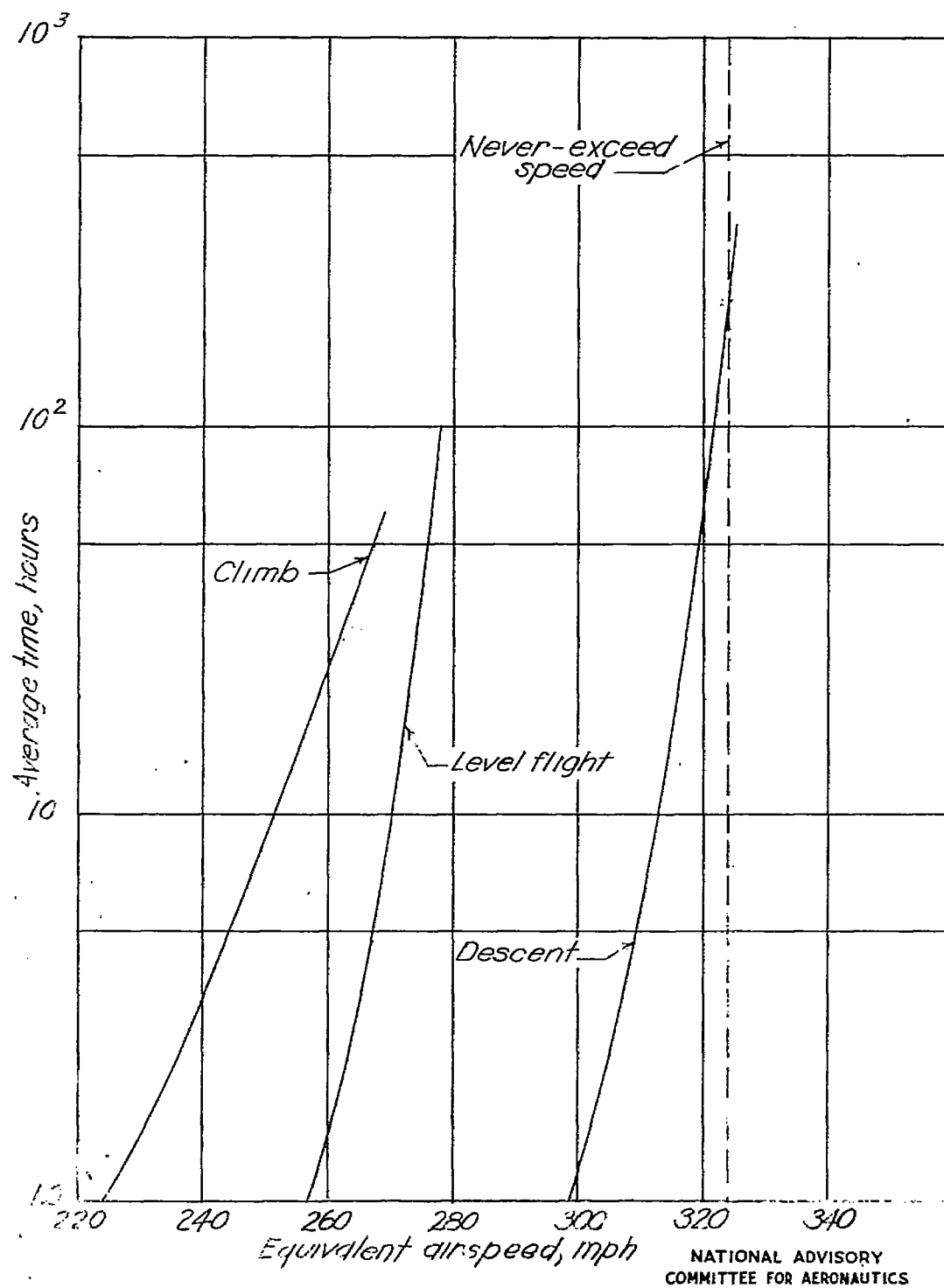


Figure 3.- Average time required to exceed a given value of airspeed.

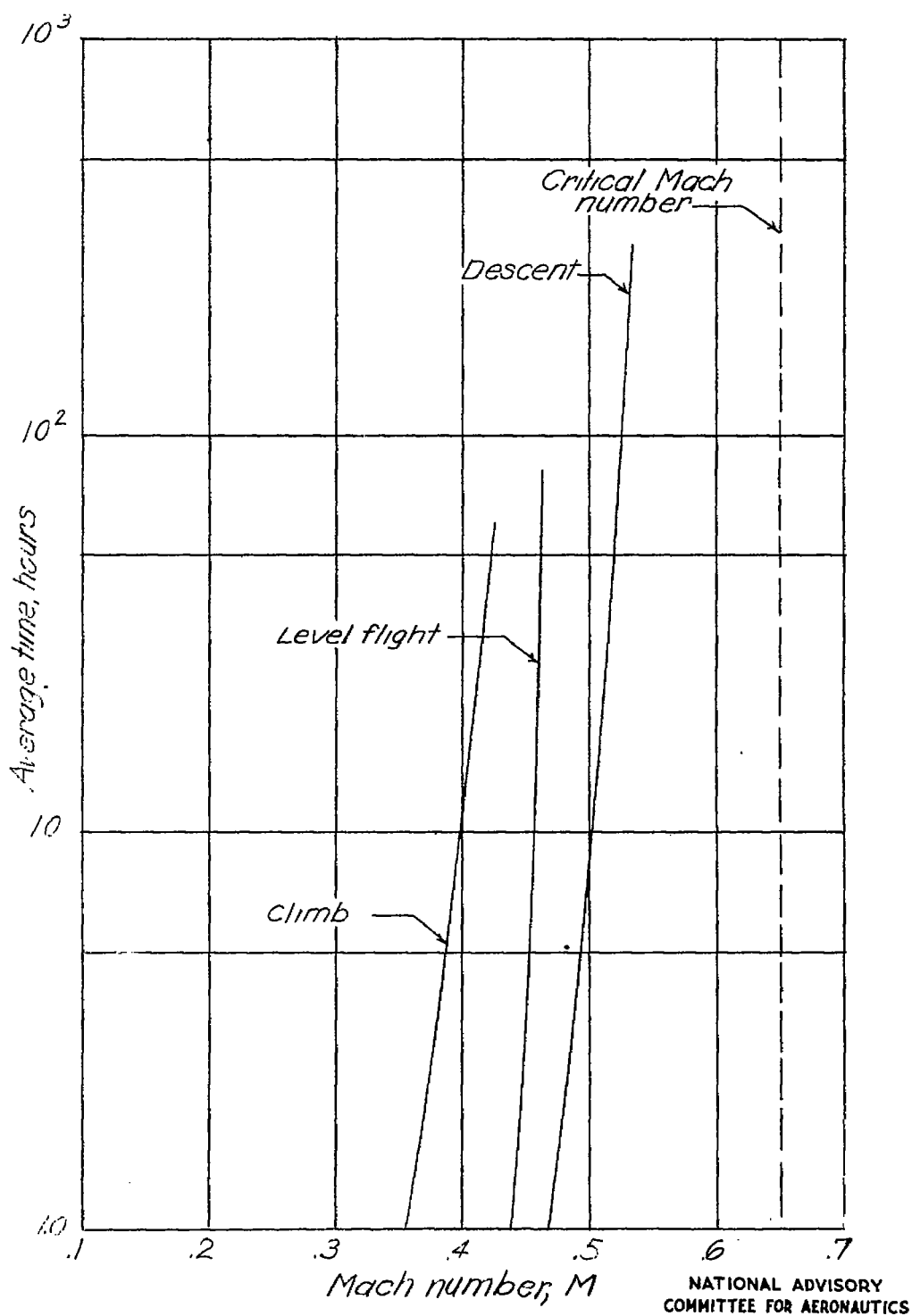


Figure 4.-Average time required to exceed a given value of Mach number.

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